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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,763	06/23/2003	Norio Ohkuma	03560.003317.	5711

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EXAMINER
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CULBERT, ROBERTS P

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/600,763

Applicant(s)

OHKUMA, NORIO

Examiner

Roberts Culbert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/18/05 has been entered.

### ***Response to Arguments***

Applicant's arguments filed 5/18/05 have been fully considered but they are not persuasive.

Applicant has argued that Hawkins does not teach or suggest forming a high-impurity-concentration region at a first surface of a silicon substrate so as to continuously surround a through-hole-forming region.

Applicant is incorrect. Hawkins et al. teaches the limitation as claimed by applicant. The high-impurity-concentration region (30) of Hawkins et al. is formed in a first surface of a silicon substrate and continuously surrounds a through-hole-forming region as shown in Figures 1 and 10 for example.

Applicant has argued "*a rectangular array of posts (22) on one surface of a silicon substrate are used to form rectangular etch stops (30) which provide a grid of openings (28).*"

The statement is not persuasive since there is no indication that the etch stops (30) are rectangular. Hawkins et al. instead teaches forming a circular region that continuously surrounds the through-hole forming region.

Applicant has argued that Hawkins et al. teaches forming an array of equally spaced uniformly sized posts or shapes which are intermittent as shown in Figure 9.

The argument is not persuasive because the "intermittent" etch stops of Hawkins et al. are only intermittent at the location of the hole which is the same pattern recited in the claims of the present invention.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,141,596 to Hawkins et al.**

Referring to Figures 7-9, Hawkins et al. teaches a method for making a through-hole in a silicon substrate comprising the steps of: forming a high-impurity-concentration region (30) at a first surface of the silicon substrate (32) so as to continuously surround a through-hole-forming region (Figures 1 and 10); forming an etching stop layer (36) over the through-hole-forming region and the high-impurity-concentration region; forming a mask layer (36) having an opening on a second surface of the silicon substrate, the second surface being opposite to the first surface; etching the silicon substrate at the opening through the mask layer until the etching stop layer is exposed to the second surface; (Figure 9 and Col. 7, Lines 38-48) further etching the silicon substrate until the etched portion extends to the high-impurity-concentration region; (Figure 9 and Col. 7, Lines 38-48) and removing the etching stop layer at least at the portion exposed to the second surface. (Col. 7, Lines 49-50)

Regarding Claims 2-4, Hawkins et al. teaches the high-impurity-concentration region is doped with boron impurity concentration of  $10^{20}/\text{cm}^3$  (Col. 6, Lines 62-64)

Regarding Claim 5, Hawkins et al. teaches the high-impurity-concentration region has a width of 1 to 20  $\mu\text{m}$  and a depth of 1 to 3  $\mu\text{m}$ . (Col. 6, Lines 40-65)

Regarding Claim 6, Hawkins et al. teaches the high-impurity-concentration region is formed by forming an impurity diffusion layer in the first surface of the silicon substrate.

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***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,141,596 to Hawkins et al.**

Regarding Claim 7, Hawkins teaches the method of the invention substantially as claimed, but does not teach that the silicon nitride etch stop layer is formed using low-pressure vapor deposition. However, Official Notice is taken that it is notoriously old and well known in the art of forming silicon nitride films on silicon substrates to use low-pressure vapor deposition. It would have been obvious to one of ordinary skill in the art to use low-pressure vapor deposition to form the silicon nitride etch stop layer of Hawkins in order to benefit from, uniform coverage, low levels of particulate contamination, and reduced processing cost.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (571) 272-1433. The examiner can normally be reached on Monday-Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R. Culbert



*pt*  
**PARVZ HASSENZADEH**  
**SUPERVISORY PATENT EXAMINER**